DRIVE CLEAN GUIDE

EMISSION STANDARDS, EMISSION TEST METHODS, AND TECHNICAL INFORMATION RELATING TO ONTARIO REGULATION 361/98 AS AMENDED

DRIVE CLEAN OFFICE

MINISTRY OF THE ENVIRONMENT

ONTARIO

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INTRODUCTION

Ontario's Drive Clean program is a success. In its first three years, it reduced smog-causing emissions from light vehicles by 15.4 per cent in the Greater Toronto area and by 6.1 in the first two years in the urban and commuter areas, a total of 18,300 tonnes. It has also reduced emissions of carbon monoxide, an air toxic, by about 139,000 tonnes, and carbon dioxide, a greenhouse gas, by about 47,000 tonnes. This is a result of a combination of emissions standards, test procedures and the support of vehicle owners who are helping improve the quality of our air by repairing and maintaining their vehicles.

Drive Clean was introduced in 1999 to reduce emissions of smog-causing emissions from cars, trucks and buses. The specific methods for measuring vehicle emissions as well as the standards vehicles must meet to pass a Drive Clean test are detailed in *The Drive Clean Guide*. This document has been prepared for reference by automotive specialists including Drive Clean inspectors and Drive Clean repair technicians.

The various Drive Clean requirements are based on Ontario Regulation 361/98, as amended, made under the authority of the *Environmental Protection Act*. In this document, O.R. 361/98, as amended, is referred to as the "Regulation."

The ministry's Smog Patrol also makes use of this guide by referencing the procedures and standards applicable to its enforcement program. The Smog Patrol is the on-road enforcement component of Drive Clean.

Regulations under the *Highway Traffic Act* specify which vehicles must pass an emissions test for registration renewal, for transferring ownership of a used vehicle, or for other transactions requiring a Safety Standards Certificate. These provisions are found in Regulation 628, R.R.O. 1990, as amended, and they touch on such things as model years affected, test frequency and included geographic areas. In this document, we will refer to this as the "HTA Regulation". In Regulation 628, Registered Gross Weight (RGW) determines the test notification and frequency.

The *Drive Clean Guide* is intended to accompany Ontario Regulation 361/98 and provide specific information about its requirements. This document is not a regulation, nor is it an official document of the Legislature of Ontario. This document provides ready access to test procedures and emission standards called up by the Regulation.

The *Drive Clean* logos for Light Duty Vehicles and Heavy Duty Vehicles (in English and in French), the phrase Afor the air we breathe@ and the phrase Arespirons en toute tranquillité@ are official marks of the Province of Ontario pursuant to the provisions of the Trade-marks Act (Canada). The official marks cannot be used for any purpose, whether commercial or non-commercial, without the prior written consent of the Province.

1. DEFINITIONS

The Regulation contains definitions of relevant terms. The following are additional definitions of terms used in this Guide:

CO means carbon monoxide

ETW means Equivalent Test Weight, the weight in pounds specified by the manufacturer as the representative vehicle weight for emissions testing by the ASM 2525 dynamometer test

Director means the person designated under the *Environmental Protection Act* by the Minister of the Environment to make decisions and perform other functions with respect to a regulation

GVWR stands for the gross vehicle weight rating and means the value specified by the vehicle manufacturer as the loaded weight of a single vehicle

HC means hydrocarbons

Heavy Vehicle means a motor vehicle with a GVWR of more than 4,500 kilograms

Light Truck means a motor vehicle that is not a passenger vehicle and that is a truck, utility vehicle or van and whose GVWR does not exceed 4,500 kg

Light Vehicle means a motor vehicle with a GVWR of 4,500 kilograms or less

LVW means loaded vehicle weight (the weight of the vehicle plus 300 pounds [136 kilograms])

NO_x means nitrogen oxides

On Board Diagnostic System means a system which monitors and stores information on the functioning of emission control equipment installed in or on the vehicle

Light Passenger Vehicle means a motor vehicle having a GVWR of 4,500 kg (9,921 lbs) or less which is a passenger car, minivan, or station wagon, but does not include a motorcycle, a bicycle with a motor attached or a motor scooter

RGW means the registered gross weight as determined at the time of obtaining a permit for the vehicle, and has the same meaning as described in Regulation 628, R.R.O. 1990

USEPA means the United States Environmental Protection Agency

VCW means vehicle curb weight, which is the weight of the vehicle with fuel tank(s) full and all necessary components mounted (but without passengers or luggage)

The Regulation provides certain special rules for determining the "model year" of a grey market vehicle, hot rod, kit car or rebuilt car for the purposes of emissions testing.

1.1 DRIVE CLEAN INSPECTORS AND REPAIR TECHNICIANS

(1) Training requirements for a Drive Clean inspector for light vehicles.

(2) Training requirements for a Drive Clean inspector for heavy vehicles.

(3) Qualifications and training requirements for a Drive Clean repair technician.

(4) Suspension or revocation of status as a Drive Clean inspector or repair technician.

(5) Opportunity to make written or oral submissions prior to suspension or revocation as a Drive Clean inspector or Drive Clean repair technician.

(6) Providing for duration of suspension.

(7) Provision to bring suspension or revocation to an end.

2. TESTING MOTOR VEHICLES WITH RESPECT TO AIR EMISSIONS

The Regulation contains the following information and provisions:

(1) Prohibition for person other than a Drive Clean inspector for light vehicles or heavy vehicles to determine compliance with the maximum emission standards in Sections 7 and 10.

(2) Prohibition for person other than a Drive Clean inspector for light vehicles to determine compliance with the maximum emission standards in Sections 8, 9 and 11.

(3) Provision for a Drive Clean inspector for heavy vehicles to determine compliance of light diesel-fuelled vehicles using the maximum emission standards applicable to heavy diesel-fuelled vehicles.

(4) Prohibition for person other than a Drive Clean inspector for heavy vehicles to determine compliance with the maximum emission standards in Section 12.

(5) Requirement for testing to take place at an Ontario Drive Clean testing facility.

(6) Provision for a provincial officer or police officer to determine compliance with the emission standards at any location.

(7) If testing shows compliance with maximum emissions standards, an Ontario Drive Clean facility may issue an emissions inspection report indicating that vehicle complies with the standards.

(8) Whenever a motor vehicle is tested under the Regulation a test of the on-board diagnostics system may be carried out, if the vehicle is a model year after 1997. The procedure to be used for testing of an on-board diagnostics system in a motor vehicle after model year 1997 is provided in Table 2. A test may be used that the Director considers equivalent.

TABLE 2

ON-BOARD DIAGNOSTICS SYSTEM TEST: LIGHT AND HEAVY VEHICLES

Model year and GVWR	Test	Compliance
1998 & later, light vehicle	Turn ignition on, look for response from malfunction indicator lamp	Malfunction indicator lamp must illuminate - Advisory Only
	Start engine, look for response from malfunction indicator lamp	Malfunction indicator lamp stays illuminated temporarily but must not stay illuminated - Advisory Only

NOTES: (1) A malfunction indicator lamp is designed to illuminate when the ignition is turned on to show that the lamp is working, but extinguish a few seconds after the engine is started.

(2) The on-board diagnostic system test for heavy vehicles will be specified in a future amendment to the Guide.

(9) The Director may permit a person to deliberately alter a vehicle to assess the quality of an Ontario Drive Clean facility and the competence of staff at the facility.

3. APPLICATION

The provisions of the Regulation apply as follows:

(1) Application of the requirements respecting visible emissions to every motor vehicle operating in Ontario.

(2) Application of the entire regulation to every motor vehicle operating in Ontario for which a permit under the *Highway Traffic Act* is in effect.

(3) Application of the entire Regulation to heavy vehicles operating in Ontario. This includes out of province vehicles. Sections that deal only with light vehicles are excluded.

4. EMISSION CONTROL EQUIPMENT FOR KIT CARS, REBUILT CARS AND HOT RODS

The Regulation contains the following provisions concerning kit cars, rebuilt cars and hot rods:

(1) Requirements for pollution control equipment on kit cars or rebuilt cars registered in Ontario.

(2) Requirements for hot rods to meet emission control standards and have pollution control equipment attached.

5. CATALYTIC CONVERTERS

The Regulation contains the following provisions concerning catalytic converters:

(1) Prohibition on using leaded gasoline as a fuel to operate a motor vehicle manufactured with a catalytic convertor.

(2) Prohibition on operating a motor vehicle with a catalytic converter if leaded gasoline has been used.

(3) The prohibition in section 22(3) of the Act against removing equipment, including the catalytic converter, except to immediately repair or replace it, is augmented by a prohibition on routing exhaust gases around the catalytic converter.

(4) Prohibition on operating a motor vehicle manufactured with a catalytic converter if the catalytic convertor is not maintained or installed so that it functions as intended.

6. VISIBLE EMISSIONS

The Regulation contains the following provisions concerning visible emissions:

(1) Prohibition on operating a light vehicle if there is a visible emission for a specified period of time.

(2) Prohibition on operating a heavy vehicle if there is a visible emission for a specified period of time.

6.1 and 7. EMISSION CONTROL SYSTEMS OR DEVICES

The Regulation contains the following provisions concerning emission control systems or devices:

- Prescribes satisfactory replacements for emission control systems, devices, or parts.
- Prohibition on operating a motor vehicle manufactured with pollution control equipment if the equipment is not properly maintained or not kept installed or not functioning as intended.

8. TWO SPEED IDLE TEST GASOLINE FUELLED LIGHT VEHICLES (AND OTHER FUELS EXCEPT DIESEL)

Maximum emission standards for the preconditioned two speed idle test are provided in Table 8.

The procedure to be used is the preconditioned two speed idle test set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – *Recommended I/M Short Test Procedures for the 1990's: Six Alternatives*.

A test may be used that the Director considers equivalent.

TABLE 8
MAXIMUM EMISSION STANDARDS
TWO SPEED IDLE TEST*
GASOLINE FUELLED LIGHT VEHICLES
(AND OTHER FUELS EXCEPT DIESEL)

Model year and GVWR For vehicles up to 3855 kg GVWR:	**HC (ppm) by volume**	**CO (%) by volume**	**Visible emissions (seconds in any one-minute period)**
1998 & later	150	0.7	5
1988-97	200	1	5
1981-1987	300	1.5	5
1980 and earlier	600	5	5
For vehicles over 3855 kg GVWR but not over 4,500 kg GVWR:			
1998 & later	200	1	5
1988-97	220	1.2	5
1980-87	300	3	5
1975-79	400	4	5
1970-74	800	6.5	5
1969 and earlier	1000	8	5

* Emission standards for both idle test and 2500 RPM test

9. DYNAMOMETER TEST
GASOLINE FUELLED LIGHT VEHICLES
(AND OTHER FUELS EXCEPT DIESEL)

The following dynamometer test is used in the program:

ASM 2525 Dynamometer Test;

Key to the Tables

Table 9-KEY below indicates where to find the appropriate maximum emission standards from the "look up" tables which follow for the ASM 2525 Dynamometer Test. These emission standards are installed in the software associated with the dynamometer test equipment, to be referenced automatically by the computer system, not manually. For light passenger vehicles and two classes of light trucks (distinguished by GVWR), a column number is specified for each group of model years and each of the three emissions of interest (hydrocarbons, carbon monoxide, and oxides of nitrogen). The column number is used to identify the emission standards in the table specified under each of the three emission headings. The applicable emission standard is found in the indicated column, opposite the Equivalent Test Weight, specified by the manufacturer, for the motor vehicle in question. For example, a light passenger vehicle of model year 1993 and equivalent test weight of 2125 lb has a maximum emission of carbon monoxide specified in Table 9-CO as 0.51%. For 2001 and 2002, the regulation requires the use of the multiplier, 1.30, which changes the result to 0.66%. (Note the use of the multiplier 1.15 for 2003 and 2004).

ASM 2525 Dynamometer Test

If a motor vehicle is tested for compliance with the maximum emission standards appearing in Tables 9-HC, 9-CO, and 9-NOX, using the Table 9-KEY below, the procedure to be used is:

- ASM 2525 Dynamometer Test (acceleration simulation mode test) as set out in the USEPA publication EPA-AA-RSPD-96-2 – *Acceleration Simulation Mode Test Procedures, Emission Standards, Quality Control Requirements, and Equipment Specifications, Technical Guidance, Attachment B, July 1996.*

If a motor vehicle is tested for compliance with the maximum emission standards appearing in Table 8 following the ASM 2525 Dynamometer Test, the procedure to be used is the Two Speed Idle test in the previous Section 8, with the exception that only the curb idle speed is used (single speed idle - accelerator at rest).

A test may be used that the Director considers equivalent.

TABLE 9-KEY: KEY TO TABLES 9-HC, 9-CO, 9-NOX
for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

Light passenger vehicles (non diesel)			
Model years	**Hydrocarbons** **Table 9-HC**	**Carbon monoxide** **Table 9-CO**	**Nitrogen Oxides** **Table 9-NOX**
1996+	1	21	41
1992-1995	1	21	41
1988-1991	1	21	42
1984-1987	2	22	44
1981-1983	2	22	45
1980 and earlier	10	30	51

Light Trucks 1 (less than or equal to 6,000 pounds (2722 kg) GVWR - non diesel)			
Model years	**Hydrocarbons** **Table 9-HC**	**Carbon monoxide** **Table 9-CO**	**Nitrogen Oxides** **Table 9-NOX**
1996+	1	21	42
1992-1995	1	21	43
1988-1991	2	22	44
1984-1987	3	23	45
1981-1983	3	24	46
1980 and earlier	10	30	51

Light Trucks 2 (greater than 6,000 pounds (2722 kg) but less than or equal to 9,921 pounds (4,500 kg) (GVWR – non diesel)			
Model years	**Hydrocarbons** **Table 9-HC**	**Carbon monoxide** **Table 9-CO**	**Oxides of nitrogen** **Table 9-NOX**
1996+	2	22	46
1992-1995	2	22	47
1988-1991	3	23	48
1984-1987	4	24	49
1981-1983	6	25	49
1980 and earlier	10	30	51

TABLE 9-HC: HYDROCARBONS (ppm - hexane equivalent)

Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

2001 - 2002: Use values in Columns 1 to 13 multiplied by 1.3;

2003 - 2004: Use values in Columns 1 to 13 multiplied by 1.15;

After 2004: Use values in Columns 1 to 13.

ETW (lb)	1	2	3	4	5	6	7	8	9	10	11	12	13
1750	105	166	192	217	242	280	293	305	344	534	585	637	845
1875	99	158	182	205	228	265	276	288	324	502	552	600	795
2000	95	149	172	194	216	250	261	272	306	474	520	566	750
2125	89	142	163	184	205	237	247	258	289	448	491	535	708
2250	85	135	155	175	195	225	235	245	275	424	465	506	671
2375	82	128	148	166	185	213	223	232	261	402	441	480	636
2500	78	123	141	158	177	203	212	222	248	382	418	456	605
2625	75	118	135	152	168	194	202	211	236	363	398	434	575
2750	72	113	129	145	162	185	194	202	226	347	381	415	549
2875	68	108	124	139	155	178	185	193	216	332	364	396	525
3000	66	105	119	134	149	171	178	185	208	318	348	379	503
3125	64	102	115	129	143	165	172	178	200	305	335	365	483
3250	62	98	112	125	138	158	165	172	192	294	322	351	465
3375	60	95	108	121	134	153	160	166	185	283	311	338	448
3500	58	92	105	117	130	148	155	161	180	273	300	326	433
3625	57	90	102	114	126	144	150	156	174	265	290	316	418
3750	55	88	99	111	122	140	145	152	169	256	281	306	405
3875	54	85	96	108	119	136	142	147	164	248	273	297	394
4000	52	83	94	105	116	132	138	143	160	242	265	288	382
4125	52	82	92	102	113	129	135	139	155	235	258	281	372
4250	50	79	90	100	110	126	131	136	152	228	251	273	362
4375	49	78	88	98	108	123	128	133	148	223	245	266	353
4500	48	76	86	95	105	120	125	130	145	217	238	259	344
4625	47	75	84	94	103	117	122	127	141	212	232	253	335
4750	46	73	82	92	101	115	119	124	138	207	227	247	327
4875	45	72	81	90	98	112	117	121	135	202	222	241	319
5000	45	71	79	88	97	110	114	118	132	197	216	235	312
5125	44	69	78	86	95	107	112	115	128	192	211	229	304
5250	43	68	76	85	92	105	109	113	125	188	205	224	297
5375	42	66	75	82	91	102	107	111	122	183	201	218	289
5500	42	65	73	81	88	100	105	108	120	178	196	213	282
5625	41	64	72	79	87	98	102	106	117	174	191	208	276
5750	40	63	70	78	85	96	100	104	115	170	187	203	269
5875	39	62	69	76	83	94	98	102	112	166	182	198	263
6000	38	61	68	75	82	92	95	99	110	162	178	194	257
6125	38	60	66	73	80	91	94	97	108	158	175	190	252
6250	37	58	65	72	78	88	92	95	105	155	171	186	246
6375	37	58	65	71	78	87	91	94	104	152	168	182	242
6500	36	57	64	70	76	86	89	92	102	150	165	179	238
6625	35	57	63	69	75	85	88	92	101	148	162	177	234
6750	35	56	62	68	75	84	87	90	99	146	161	175	232
6875	35	56	62	68	75	84	87	90	99	145	159	173	230
7000	35	55	62	68	74	83	86	89	98	145	159	173	229
7125	35	55	62	68	74	83	86	89	98	145	158	173	229
7250	35	55	62	68	74	83	86	89	98	145	158	173	229
7375	35	55	62	68	74	83	86	89	98	145	158	173	229
≥7500	35	55	62	68	74	83	86	89	98	145	158	173	229

TABLE 9-CO: CARBON MONOXIDE (per cent carbon monoxide)
Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

2001 - 2002: Use values in Columns 21 to 34 multiplied by 1.3;
2003 - 2004: Use values in Columns 21 to 34 multiplied by 1.15;
After 2004: Use values in Columns 21 to 34.

ETW (lb)	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1750	0.59	0.94	1.41	1.87	2.10	2.80	3.03	3.26	3.73	4.19	4.66	5.58	5.72	7.62
1875	0.56	0.89	1.32	1.76	1.98	2.64	2.85	3.08	3.52	3.95	4.38	5.26	5.42	7.62
2000	0.53	0.84	1.25	1.67	1.87	2.49	2.70	2.90	3.32	3.73	4.14	4.96	5.14	7.62
2125	0.51	0.80	1.18	1.58	1.77	2.35	2.55	2.75	3.14	3.52	3.92	4.69	4.88	7.43
2250	0.48	0.76	1.13	1.49	1.68	2.23	2.42	2.60	2.97	3.34	3.71	4.45	4.62	7.03
2375	0.45	0.72	1.07	1.42	1.59	2.12	2.29	2.47	2.82	3.17	3.52	4.22	4.38	6.67
2500	0.44	0.69	1.02	1.35	1.52	2.02	2.18	2.35	2.68	3.01	3.35	4.01	4.16	6.35
2625	0.42	0.66	0.98	1.29	1.45	1.92	2.08	2.24	2.55	2.87	3.18	3.82	3.96	6.04
2750	0.40	0.63	0.93	1.23	1.38	1.84	1.98	2.14	2.44	2.74	3.04	3.64	3.78	5.77
2875	0.38	0.61	0.89	1.18	1.32	1.76	1.90	2.05	2.33	2.62	2.91	3.48	3.62	5.52
3000	0.37	0.58	0.86	1.14	1.28	1.68	1.82	1.96	2.24	2.52	2.78	3.34	3.47	5.28
3125	0.35	0.56	0.83	1.09	1.22	1.62	1.75	1.88	2.15	2.42	2.68	3.21	3.33	5.08
3250	0.35	0.55	0.80	1.05	1.18	1.56	1.69	1.82	2.07	2.32	2.58	3.08	3.21	4.88
3375	0.33	0.53	0.77	1.02	1.14	1.51	1.63	1.75	2.00	2.24	2.48	2.98	3.09	4.72
3500	0.32	0.52	0.75	0.98	1.10	1.45	1.58	1.69	1.93	2.17	2.40	2.88	2.98	4.55
3625	0.32	0.50	0.72	0.95	1.07	1.42	1.52	1.64	1.87	2.10	2.32	2.78	2.89	4.41
3750	0.31	0.48	0.71	0.92	1.04	1.37	1.48	1.59	1.82	2.03	2.25	2.70	2.80	4.27
3875	0.30	0.47	0.68	0.90	1.01	1.33	1.44	1.55	1.76	1.98	2.19	2.62	2.72	4.15
4000	0.29	0.46	0.67	0.88	0.98	1.29	1.40	1.50	1.71	1.92	2.13	2.55	2.65	4.03
4125	0.28	0.45	0.65	0.85	0.95	1.26	1.36	1.46	1.66	1.87	2.07	2.48	2.57	3.92
4250	0.28	0.44	0.64	0.83	0.93	1.23	1.32	1.42	1.62	1.82	2.02	2.41	2.50	3.82
4375	0.27	0.43	0.62	0.82	0.91	1.20	1.29	1.39	1.58	1.78	1.96	2.35	2.44	3.72
4500	0.27	0.42	0.61	0.79	0.89	1.17	1.26	1.35	1.55	1.73	1.92	2.29	2.38	3.62
4625	0.26	0.42	0.59	0.78	0.87	1.14	1.23	1.32	1.51	1.68	1.87	2.23	2.32	3.54
4750	0.25	0.41	0.58	0.76	0.85	1.12	1.21	1.29	1.47	1.65	1.82	2.18	2.27	3.45
4875	0.25	0.40	0.57	0.75	0.83	1.09	1.18	1.26	1.44	1.61	1.78	2.13	2.21	3.37
5000	0.25	0.39	0.56	0.73	0.81	1.06	1.15	1.23	1.40	1.57	1.74	2.08	2.16	3.29
5125	0.24	0.38	0.55	0.71	0.79	1.04	1.12	1.21	1.37	1.54	1.70	2.03	2.11	3.22
5250	0.24	0.38	0.54	0.69	0.78	1.02	1.10	1.18	1.34	1.50	1.66	1.98	2.06	3.14
5375	0.23	0.37	0.52	0.68	0.76	0.99	1.07	1.15	1.31	1.46	1.62	1.93	2.01	3.06
5500	0.23	0.36	0.52	0.67	0.75	0.97	1.05	1.12	1.28	1.43	1.58	1.89	1.96	2.99
5625	0.22	0.35	0.50	0.65	0.72	0.95	1.02	1.10	1.25	1.40	1.55	1.85	1.92	2.92
5750	0.22	0.35	0.49	0.64	0.71	0.93	1.00	1.08	1.22	1.37	1.51	1.80	1.87	2.85
5875	0.22	0.34	0.48	0.62	0.70	0.91	0.98	1.05	1.19	1.34	1.48	1.76	1.83	2.78
6000	0.22	0.34	0.48	0.62	0.68	0.89	0.96	1.03	1.17	1.31	1.45	1.72	1.79	2.72
6125	0.21	0.33	0.47	0.60	0.67	0.87	0.94	1.01	1.15	1.28	1.42	1.68	1.75	2.67
6250	0.21	0.32	0.46	0.59	0.65	0.85	0.92	0.98	1.12	1.25	1.38	1.65	1.72	2.62
6375	0.20	0.32	0.45	0.58	0.65	0.84	0.91	0.97	1.10	1.23	1.36	1.62	1.68	2.57
6500	0.20	0.32	0.45	0.57	0.64	0.83	0.89	0.95	1.08	1.21	1.34	1.59	1.65	2.52
6625	0.20	0.32	0.44	0.56	0.63	0.82	0.88	0.95	1.07	1.19	1.32	1.57	1.63	2.48
6750	0.20	0.32	0.44	0.56	0.62	0.81	0.87	0.93	1.05	1.18	1.31	1.55	1.62	2.46
6875	0.19	0.31	0.43	0.55	0.62	0.80	0.86	0.92	1.05	1.17	1.29	1.54	1.60	2.44
7000	0.19	0.31	0.43	0.55	0.62	0.80	0.86	0.92	1.05	1.17	1.29	1.54	1.60	2.44
7125	0.19	0.31	0.43	0.55	0.62	0.80	0.86	0.92	1.05	1.17	1.29	1.54	1.60	2.44
7250	0.19	0.31	0.43	0.55	0.62	0.80	0.86	0.92	1.05	1.17	1.29	1.54	1.60	2.44
7375	0.19	0.31	0.43	0.55	0.62	0.80	0.86	0.92	1.05	1.17	1.29	1.54	1.60	2.44
> 7500	0.19	0.31	0.43	0.55	0.62	0.8	0.86	0.92	1.05	1.17	1.29	1.54	1.6	2.44

TABLE 9-NOX: NITROGEN OXIDES (ppm nitric oxide)

Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

2001 - 2002: Use values in Columns 41 to 51 multiplied by 1.3;

2003 - 2004: Use values in Columns 41 to 51 multiplied by 1.15;

After 2004: Use values in Columns 41 to 51.

ETW (lb)	41	42	43	44	45	46	47	48	49	50	51
1750	842	1263	1626	1990	2354	2717	3081	3808	3815	3831	3838
1875	793	1190	1532	1873	2215	2556	2898	3581	3645	3774	3838
2000	748	1123	1444	1765	2087	2408	2729	3372	3488	3722	3838
2125	708	1062	1365	1667	1970	2273	2575	3182	3345	3674	3838
2250	670	1005	1291	1577	1863	2149	2435	3007	3215	3631	3838
2375	636	954	1225	1495	1765	2035	2306	2847	3095	3591	3838
2500	605	907	1163	1419	1676	1932	2188	2702	2985	3554	3838
2625	576	864	1108	1351	1595	1838	2082	2568	2886	3521	3838
2750	550	825	1057	1288	1520	1752	1984	2447	27[illegible]	3365	3671
2875	526	789	1010	1232	1452	1673	1895	2336	2628	3212	3505
3000	505	757	968	1179	1391	1602	1813	2235	2515	3074	3353
3125	485	727	929	1132	1334	1536	1738	2144	2412	2948	3215
3250	467	700	895	1088	1282	1477	1671	2059	2317	2832	3089
3375	450	675	862	1048	1235	1422	1609	1982	2230	2726	2974
3500	435	652	832	1012	1192	1372	1552	1912	2151	2629	2868
3625	421	632	805	979	1152	1326	1500	1847	2078	2540	2771
3750	408	612	780	948	1116	1284	1452	1787	2011	2458	2681
3875	396	595	757	919	1082	1245	1407	1732	1948	2382	2598
4000	385	578	735	893	1050	1208	1365	1680	1890	2310	2520
4125	375	562	715	868	1021	1174	1326	1632	1836	2244	2448
4250	365	548	696	845	993	1142	1290	1587	1785	2182	2380
4375	356	534	678	822	967	1111	1255	1544	1737	2122	2315
4500	347	521	661	802	942	1082	1222	1502	1691	2066	2254
4625	338	508	645	781	918	1054	1191	1464	1646	2012	2195
4750	331	496	629	762	895	1028	1160	1426	1604	1961	2138
4875	323	485	614	743	872	1002	1131	1389	1563	1910	2084
5000	315	473	598	725	851	976	1102	1354	1523	1862	2031
5125	308	462	585	707	829	952	1075	1319	1485	1815	1979
5250	301	451	570	689	808	928	1048	1286	1447	1768	1928
5375	294	441	556	672	788	905	1021	1253	1410	1723	1879
5500	287	430	543	656	769	882	995	1221	1374	1679	1832
5625	280	420	530	640	750	860	970	1190	1338	1636	1785
5750	274	411	518	625	732	838	946	1160	1305	1595	1740
5875	268	402	505	610	714	818	922	1132	1272	1555	1697
6000	262	392	494	595	697	799	901	1104	1242	1518	1655
6125	256	384	483	582	682	781	880	1078	1213	1482	1617
6250	251	376	473	570	667	764	861	1055	1186	1449	1582
6375	246	369	465	559	654	748	843	1033	1162	1420	1549
6500	242	364	456	549	642	735	828	1014	1141	1395	1521
6625	239	358	450	542	633	724	815	998	1123	1373	1498
6750	236	355	445	535	625	716	806	987	1110	1357	1480
6875	235	352	442	532	621	711	800	979	1102	1346	1468
7000	235	352	441	530	619	708	798	976	1098	1342	1465
7125	235	352	441	530	619	708	798	976	1098	1342	1465
7250	235	352	441	530	619	708	798	976	1098	1342	1465
7375	235	352	441	530	619	708	798	976	1098	1342	1465
≥7500	235	352	441	530	619	708	798	976	1098	1342	1465

Dynamometer Test
Gasoline Fuelled Light Vehicles
(and other fuels except diesel)

Additional Maximum Emission Standard (Evaporative System)

Test procedures for the following "Fuel cap integrity standard" is contained in the USEPA publication EPA-AA-RSPD-IM-96-1 June 1996 – High-Tech I/M Test Procedures, Emission Standards, Quality Control Requirements, and Equipment Specifications: IM240 and Functional Evaporative System Tests, Revised Technical Guidance Draft, June 1996.

> **Fuel cap integrity standard**
> The vehicle's fuel cap must exhibit a pressure loss of less than six inches of water when a fuel cap integrity test is performed on the vehicle's evaporative system or must exhibit a flow rate of 60 cubic centimetres per minute or less of air at 30 inches of water column.

Tests may be used that the Director considers equivalent.

9.1 REPAIR COST LIMIT FOR NON-DIESEL FUELLED LIGHT VEHICLES

The regulation specifies provisions and conditions for a repair cost limit (RCL) for light vehicles in non-compliance with prescribed standards. In other words, if emission system repairs would cost more than the RCL, this provision allows the owner to spend a smaller amount and still qualify for vehicle registration. The amount of the RCL varies with the program area where the vehicle is registered, and the timing of the retest. If the vehicle meets the RCL conditions, the facility issues a conditional emissions inspection report. The conditional emissions inspection report may be used to meet the vehicle registration renewal requirements in Regulation 628.

9.2 REPAIRS NOT POSSIBLE FOR NON-DIESEL FUELLED LIGHT VEHICLES

The regulation specifies provisions and conditions for issuing a conditional emissions inspection report indicating that the vehicle is not required to comply with emissions standards when two Ontario Drive Clean repair facilities certify that it is not reasonably possible to correct the problem. The report may be used to meet the vehicle registration renewal requirements in Regulation 628.

10. TWO SPEED IDLE TEST
GASOLINE FUELLED HEAVY VEHICLES
(AND OTHER FUELS EXCEPT DIESEL)

This section applies only to heavy vehicles with a GVWR greater than 4,500 kg, but is otherwise equivalent to Section 8.

Maximum emission standards for the preconditioned two speed idle test are provided in Table 10.

The procedure to be used is the preconditioned two speed idle test procedure set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – *Recommended I/M Short Test Procedures for the 1990's: Six Alternatives.*

A test may be used that the Director considers equivalent.

TABLE 10
MAXIMUM EMISSION STANDARDS
TWO SPEED IDLE TEST
Gasoline Fuelled Heavy Vehicles
(and other fuels except diesel)

Model year	**HC (ppm) by volume**	**CO (%) by volume**	**Visible emissions (seconds in any one-minute period)**
1998 & later	200	1	5
1988-97	220	1.2	5
1980-87	300	3	5
1975-79	400	4	5
1970-74	800	6.5	5
1969 and earlier	1000	8	5

11. OPACITY TEST
DIESEL FUELLED LIGHT VEHICLES

The following two opacity tests are used in the program:

Light Diesel Loaded Mode Dynamometer Test
Light Diesel Fast Idle Test

The latter will be used only for a vehicle that cannot be tested on a dynamometer.

Another test may be used that the Director considers equivalent.

The maximum emission standard for a light vehicle, operating on diesel fuel, of a model year set out in Column 1 of Table 11 is the maximum opacity of the exhaust emissions shown opposite that model year in Column 2 in the portion of the Table appropriate to the test used.

Opacity is evaluated in terms of smoke density and expressed as "K m^{-1}" (K is a relative scale in units per metre). The larger the K value, the greater the opacity of the emissions. Using smoke density units eliminates the need to accurately determine tailpipe inside diameter and the resulting conversion to opacity percentage. Smoke density shall be measured by an approved Ontario Diesel Test Unit employing an optical chamber to determine smoke density (k-value) of the exhaust sample in the range 0 to 10 m^{-1}.

Light Diesel Loaded Mode Dynamometer Test

The test is conducted on a loaded mode dynamometer at 40 km/hour with the same roll speed, engine speed, and acceleration error limits, as the ASM 2525 dynamometer test.

The vehicle is placed on the chassis dynamometer and operated at 40 km/h with a dynamometer load (HP) equal to the number of engine cylinders plus 8.0. An exhaust sample probe is inserted into the vehicle tailpipe and an exhaust stream sample is drawn into an approved Ontario Diesel Test Unit to measure the smoke density. The smoke density measurement is compared to the applicable limit to determine the emissions pass/fail result.

Light Diesel Fast Idle Test

For vehicles that cannot be dynamometer tested, a Fast Idle Smoke Density Test shall be performed. An exhaust sample probe is inserted into the vehicle tailpipe and an exhaust sample is drawn into an approved Ontario Diesel Test Unit to measure the smoke density. The engine is accelerated to 2000 +/- 200 RPM and held within that speed range during the emissions sample period. The smoke density measurement is compared to the applicable limit to determine the emissions pass/fail result.

TABLE 11
MAXIMUM EMISSION STANDARDS
Opacity test
Diesel Fuelled Light Vehicles

Model Year	**Greater Toronto Area, urban and commuter areas, and Expanded Program Area** **[maximum opacity]**
1	2
Light Diesel Loaded Mode Dynamometer Test	
Before 1982	3.0
1982 to 1987	2.0
1988 – 1998	1.8
After 1998	1.5
Light Diesel Fast Idle Test	
Before 1982	2.5
1982 – 1987	1.6
1988 – 1998	1.4
After 1998	1.2

12. OPACITY TEST
DIESEL FUELLED HEAVY VEHICLES

This section applies to diesel-fuelled heavy vehicles.

In a period of time indicated in Column 1 of Table 12, the maximum emission standard for a motor vehicle of a model year and type indicated in Columns 2 and 3 of the Table is prescribed as the percentage opacity of the exhaust emissions specified opposite in Column 4 when the motor vehicle is tested using one of the following tests:

(a) the opacity test for diesel fuelled heavy vehicles according to SAE J1667 snap acceleration smoke test procedure for heavy diesel powered vehicles, issued by the Society of Automotive Engineers, Inc. 1996-02;

(b) a test that the Director considers equivalent to the test mentioned in clause (a); or

(c) the Roadside Opacity Test, described below, provided that,

  (i) the Roadside Opacity Test may be used only by a Provincial Officer designated under the *Environmental Protection Act*, and

  (ii) the Roadside Opacity Test is not acceptable for the purpose of s. 8.2 of Regulation 628, Vehicle Permits, Revised Regulations of Ontario, 1990, under the *Highway Traffic Act*.

Definition - School Bus

For purposes of this section, "school bus" has the same meaning as in the *Highway Traffic Act*.

[see Highway Traffic Act, s. 175(1):

"school bus" means a bus that,

(a) is painted chrome yellow, and

(b) displays on the front and rear thereof the words "school bus" and on the rear thereof the words "do not pass when signals flashing". ("autobus scolaire")]

Heavy Duty Diesel Fuelled Vehicles - 20 per cent opacity or less

Any diesel fuelled heavy vehicle which achieves 20% opacity or less when tested in accordance with this section, may be exempt from emissions testing requirements in eligible years as defined by Regulation 628 under the *Highway Traffic Act*. This program is designed by the Ministry of the Environment as an incentive for heavy duty diesel fuelled vehicles to achieve emission results much better than the minimum requirement.

TABLE 12
MAXIMUM EMISSION STANDARDS
OPACITY TEST
DIESEL FUELLED HEAVY VEHICLES

Time Period	Model year	Vehicle Type	Opacity
September 30, 1999 - March 31, 2004	1990 and older	All	55%
	1991 and newer	All	40%
April 1, 2004 - March 31, 2005	1990 and older	School Bus	35%
		Other	45%
	1991 and newer	School Bus	35%
		Other	35%
April 1, 2005 & later	1990 and older	School Bus	30%
		Other	40%
	1991 and newer	School Bus	30%
		Other	30%

Roadside Opacity Test for
Diesel Fuelled Heavy Vehicles

1.0 Purpose

This document provides a procedure to conduct roadside testing of Diesel Fuelled Heavy Vehicles (gross vehicle weight rating [GVWR] greater than 4,500 kg) to assess compliance with section 12 of O. Reg. 361/98.

2.0 Limitations

2.1 This procedure shall only be used by Provincial Officers designated under the *Environmental Protection Act*.

2.2 This procedure requires the use of a sampling type smokemeter, also called a partial flow smokemeter, which appears in the following list:

Wager Portable Smoke Meter Model 6700;
Wager Portable Smoke Meter Model 7500;
Red Mountain Engineering Smoke Check 1667;
Bosch RTT 100 Diesel Smoke Opacimeter.

2.3 Ambient Air Test Conditions:

2.3.1 No testing shall occur when visible humidity (for example fog, rain and snow) is present where exhaust samples are drawn or the smoke plume is measured.

2.3.2 No testing shall occur when the ambient air temperature at the test location is below 2 °C (36 ° F) or above 30 °C (86 ° F) unless correction factors to compensate for relative humidity, barometric pressure, or ambient temperature are applied.

3.0 Smokemeter Calibration Verification

3.1 The smokemeter calibration shall be verified at the beginning of each testing day unless the unit is self calibrating in which case the following steps in this section are not necessary.

3.2 Prior to any zero or full scale checks the meter shall be warmed up and stabilized according to the manufacturer's recommendations.

3.3 Prompt smokemeter to carry out a calibration verification.

3.4 With the smokemeter in opacity readout mode and with no blockage of the smokemeter light beam, check the readout to display 0.0% ± 1.0% opacity.

3.5 The calibration of the smokemeter shall be verified by using the smokemeter manufacturer's supplied neutral density filter(s). When prompted by the smokemeter, insert the filter into the sensor head ensuring it is placed between the sensor light source and detector. The opacity reading of the smokemeter should be the filter opacity percentage ± 1 %. If the smokemeter does not read within ± 1 % of the filter do not carry out any testing. Clean and re -install the neutral density filter and recheck the calibration or refer to the User Manual to troubleshoot the source of the problem.

3.6 Record the result.

4.0 Pre-test Safety Check and Vehicle Preparation

4.1 Ensure that the vehicle operator keeps the engine running. If the engine is inadvertently shut off, the engine should be immediately restarted, and the operator should be instructed to move the vehicle as quickly as possible in the vehicles lowest gear for at least 25 feet in order to activate the engine air/ fuel ratio controls on some engines.

4.2 Confirm the vehicle is diesel fuelled and has a GVWR greater than 4,500 kg (9,921 lbs).

4.3 Chock the vehicle wheels.

4.4 Visually inspect the vehicle exhaust system for any leaks. If a severe leak prevents the exhaust from exiting at the end of the stack, test at the point of leakage (unless this point is immediately downstream of a bend in the pipe). If testing is impractical, have the vehicle repaired and retested.

4.5 Confirm the engine is warmed up by observing the vehicle water and/or oil gauges or by confirming that the vehicle has been operated under load for at least 15 minutes.

4.6 Verify that the operator has set the engine idle speed to low idle.

4.7 Verify the speed-limiting capability of the engine governor using the following procedure:

4.7.1 If the vehicle is equipped with a manual transmission, the transmission must be placed in neutral and the clutch must be disengaged. If the vehicle is equipped with an automatic transmission, the transmission must be placed in the park position, if available, otherwise in the neutral position.

4.7.2 Check with the vehicle operator to determine that the vehicle's governor is operating correctly. If the governor is not working correctly the vehicle should be repaired and retested.

4.7.3 With the engine at low idle, instruct the driver to slowly depress the engine accelerator and allow the engine speed to gradually increase toward its maximum governed high idle speed. As the engine speed increases, carefully note any visual or audible indications that the engine or vehicle may be of questionable soundness. If there are no indications of problems, allow the engine speed to increase to the point that it is possible to verify that the speed-limiting capability of the governor is functioning. Should there be an indication that the speed-limiting capability of the governor is not functioning (engine speed continues to increase), or that potential engine damage, or unsafe conditions for personnel or equipment may occur, the accelerator should immediately be released, and the test aborted. If the engine speed continues to increase uncontrollably, immediately shut off the engine fuel supply. In the case of governor failure or malfunction, the vehicle should be repaired and retested.

4.8 All accessories including the vehicle air conditioning must be turned off.

4.9 If the engine is equipped with an engine brake it must be deactivated.

4.10 The parking brake and trailer brakes must be turned off and the brakes must not be applied.

4.11 All devices installed on the engine or vehicle which alter the normal acceleration characteristics of the engine and have the effect of temporarily lowering snap-acceleration results, or preventing the test from being successfully completed shall be deactivated prior to testing.

5.0 Test Procedure

With the vehicle conditioned as in 4.0:

5.1 Prior to conducting the opacity test on a vehicle equipped with multiple exhaust outlets, determine which exhaust outlet exhibits the highest smoke level by visually comparing the exhaust smoke from each outlet during one or more repetitions of the snap-acceleration test cycle. If there is no discernible difference in the exhaust smoke exiting each outlet, conduct the testing using the most convenient outlet. If there is a discernable difference in the exhaust smoke from the multiple outlets, conduct the testing using the exhaust outlet that visually appears to have the highest smoke level.

5.2 Determine either of the following:

5.2.1 Measure the outside diameter of the portion of the vehicle exhaust pipe which visually appears to have the smallest outside diameter (No engine compartment inspection required). The outside diameter of the exhaust pipe must be rounded down to the nearest whole inch or metric equivalent. If the exhaust pipe outside diameter is determined to be greater than 127 mm (5 inches) the exhaust pipe outside diameter shall be determined to be 127 mm (5 inches),

Or

5.2.2 The rated horsepower of the engine from the tune-up label affixed to the engine.

5.3 Initiate the smokemeter test sequence.

5.4 Enter required information into smokemeter as prompted. Instruct smokemeter that clean out snaps will be performed.

5.5 Prior to attaching or inserting the sensor head into the exhaust stack have the smokemeter perform zero and full scale checks when prompted.

5.6 Place sensor into the exhaust stack.

5.7 Per smokemeter prompts, have vehicle operator conduct at least 3 preliminary snap-acceleration test cycles using the sequence described in 6.0.

5.8 Within 2 minutes of the execution of the 3 preliminary snap-acceleration cycles, per smokemeter prompts, conduct the 3 official snap-acceleration test cycles using the sequence described in 6.0.

6.0 Vehicle Operator Instruction - Snap-Acceleration Test Cycle

6.1 The vehicle operator shall move the accelerator to fully open as rapidly as possible.

6.2 The operator shall hold the accelerator in the fully open position for 1 to 4 seconds after the engine has achieved its maximum governed speed.

6.3 Upon completion of the 1 to 4 seconds at maximum governed speed, the operator shall release the accelerator and allow the engine to return to low idle speed.

6.4 Once the engine has reached its low idle speed, the operator shall allow the engine to remain idle for a minimum of 5 seconds but no longer than 45 seconds before initiating the next snap-acceleration test cycle.

7.0 Test Validation

7.1 Upon completion of the 3 official snap-acceleration test cycles, remove the sensor head from the stack and if prompted by the smokemeter conduct the post-test zero procedure.

7.2 Ensure that the difference between the highest and lowest of the 3 official snap-acceleration test results is 5 opacity percentage points or less.

7.2.1 If the test was valid print out a copy of the test results and save the data.

7.2.2 If the test was invalid, repeat the test procedure. (If improper or inconsistent application of the accelerator is suspected, re-instruct the vehicle operator as to the proper execution of the snap-acceleration test cycle or refer to the smokemeters User Manual for troubleshooting invalid tests.)

7.3 The test result for comparison with the maximum emissions standards in section 12 of the Drive Clean Guide is the average opacity of the 3 official snap-acceleration tests.

13. SUBMISSION OF VEHICLE FOR TESTING

The following form has been approved by the Minister of the Environment for purposes of s. 13 of the Regulation.

Form
Environmental Protection Act
NOTICE TO SUBMIT MOTOR VEHICLE

TAKE NOTICE that under the *Environmental Protection Act* and the regulations thereunder,

Name: _____

Address: _____

Driver Licence Number: _____

is required to submit the motor vehicle bearing

Ontario Registration Plate Number _____ (year) _____

to the inspection site at _____

on _____
(month)(day) (year)

between the hours of _____ and _____ for testing and inspection.

Dated at _____ this _____ day of _____ 20__

_____

Provincial Officer
or
Police Officer

14. SERVICE OF ORDER

Section 13.1 of the Regulation provides that an order under s. 18 of the *Environmental Protection Act* [order for preventative measures] may be served on the owner or person in control of a motor vehicle or a fleet of vehicles, by leaving it with the driver of one of the vehicles.